

# Sunflower Scientists Keep Looking Ahead

**A**gricultural Research Service sunflower scientists, ever vigilant for new pathogen strains (causes of disease) that can threaten commercial sunflower crops, have a successful track record in countering them through plant breeding. In their continuing endeavor, these researchers and their international colleagues currently focus mainly on three major diseases: *Sclerotinia* stalk rot and head rot and downy mildew.

"To develop new sunflower breeding lines with disease resistance, we rely heavily on genetic resources from wild sunflowers that evolved in their native North America," says ARS plant pathologist Thomas J. Gulya, of the Red River Valley Agricultural Research Center in Fargo, North Dakota.

The North Central Regional Plant Introduction Station—a joint venture among ARS, 12 agricultural experiment stations, and Iowa State University, in Ames—now provides a reservoir of 1,600 cultivated sunflower accessions (specimens) and more than 2,200 accessions of the 49 wild sunflower species from which scientists may draw for breeding experiments or research purposes.

Scientists like Gulya are typically unsung heroes. As diseases are controlled, the low incidence of epidemics tends to go unnoticed. For example, some 15 years ago, a single registered fungicide was so effective in controlling downy mildew that commercial plant breeders did not include mildew resistance among their top breeding priorities. During the past 2 years, however, ARS scientists at Fargo have found new fungicide-resistant strains of downy mildew. Anticipating

resistance and continued evolution of other mildew races, Gulya and coworkers located new sources of mildew resistance and transferred the genes into

agronomically acceptable germplasm.

Now, new sunflower hybrids with USDA-bred resistance, combined with fungicides, may avert calamities.

The fungus *Sclerotinia* causes sunflower diseases that account for half of the disease-related yield losses in the Northern Great Plains. In some years these losses total \$15 million. *Sclerotinia* stalk rot, the most significant sunflower disease in the United States, appears year in, year out, regardless of weather.

With neither chemical-control nor genetic-resistance weapons, the U.S. grower is nearly defenseless. ARS scientists have been searching for tolerance to the disease, both in cultivated breeding lines and in wild sunflowers, for the past two decades. Recent germplasm releases by the ARS team have given the sunflower industry its first sources of tolerance to *Sclerotinia* stalk rot.

*Sclerotinia* head rot occurs during wetter-than-normal growing seasons—like September 1999. More than 75 percent of the sunflower acreage in North Dakota had head rot, which not only caused substantial yield losses, but also contaminated the soil for many years. Whenever soil is highly contaminated with sclerotia, growers must rotate to a crop like wheat, which is prone to scab, instead of to other *Sclerotinia*-susceptible broadleaf crops, such as soybeans, dry beans, or canola. ARS scientists had already been working with researchers in Argentina and France to find sources of resistance to head rot, but after the 1999 epidemic, head rot research became a much higher priority.—  
By **Ben Hardin**, ARS.

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PEGGY GREB (K9119-1)



**Plant pathologist Thomas Gulya compares a sunflower seedling showing typical symptoms of downy mildew (left) with a healthy seedling protected by a new fungicide.**